Oct. 12, 1971 J. F. O'CONNER ET AL 3,611,516

MOLD CASE AND VIBRATOR ASSEMBLY

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Fig. 1

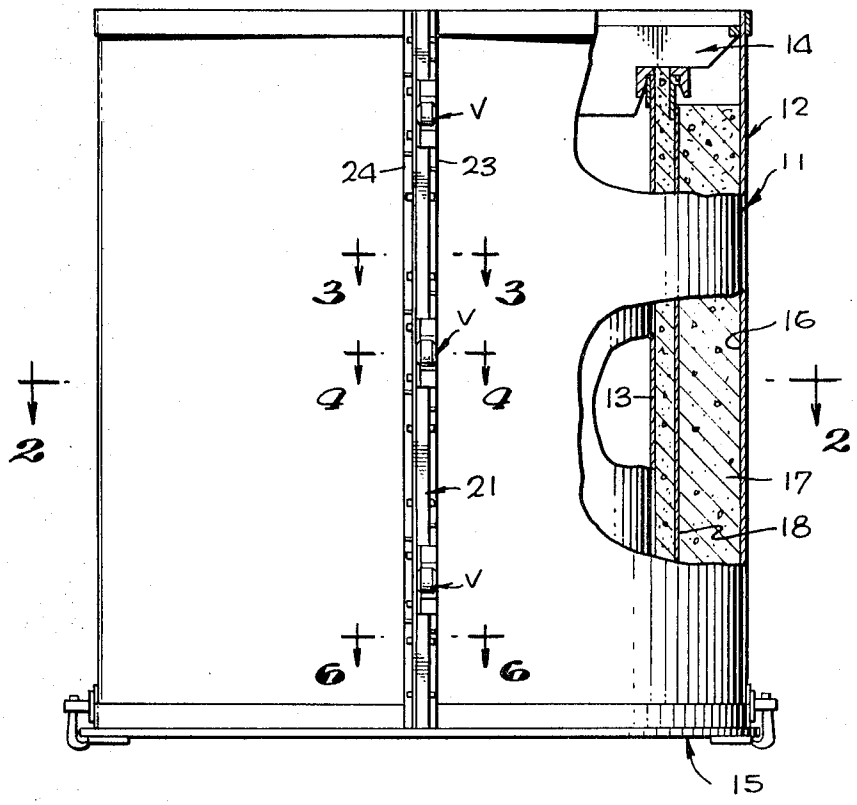


Fig. 2

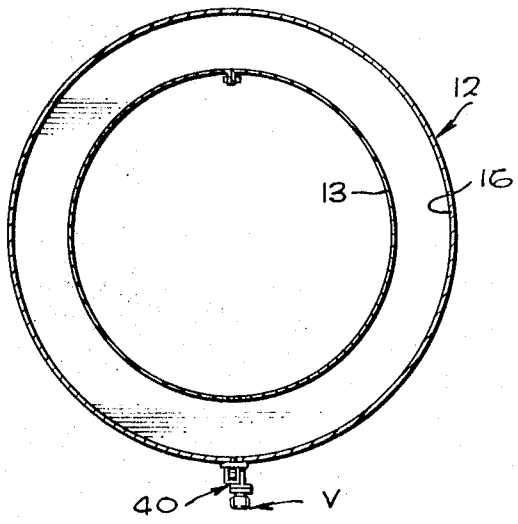
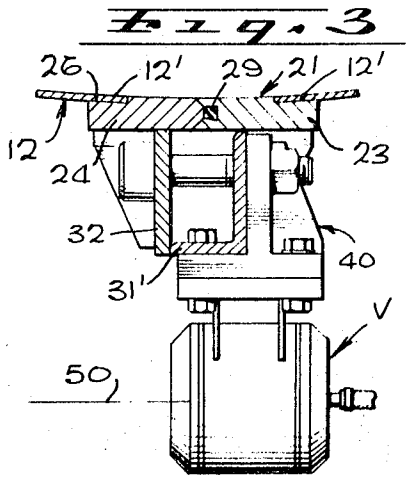


Fig. 3



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Fig. 4

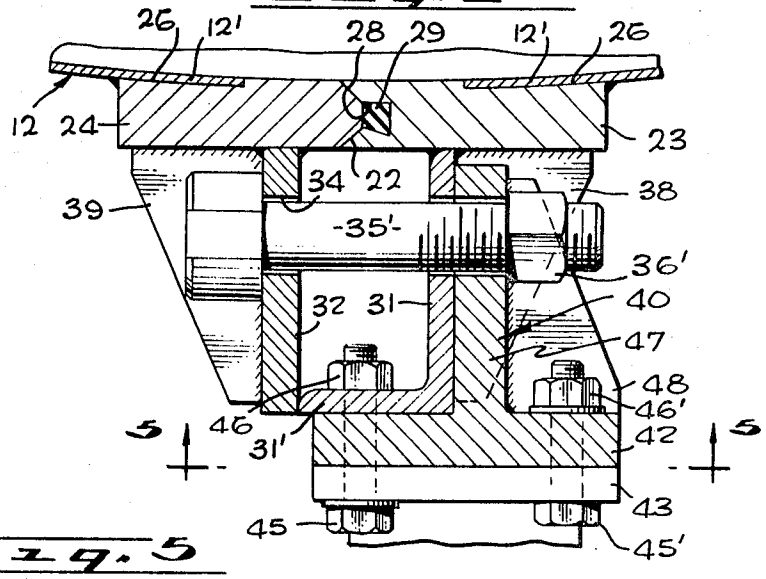


Fig. 5

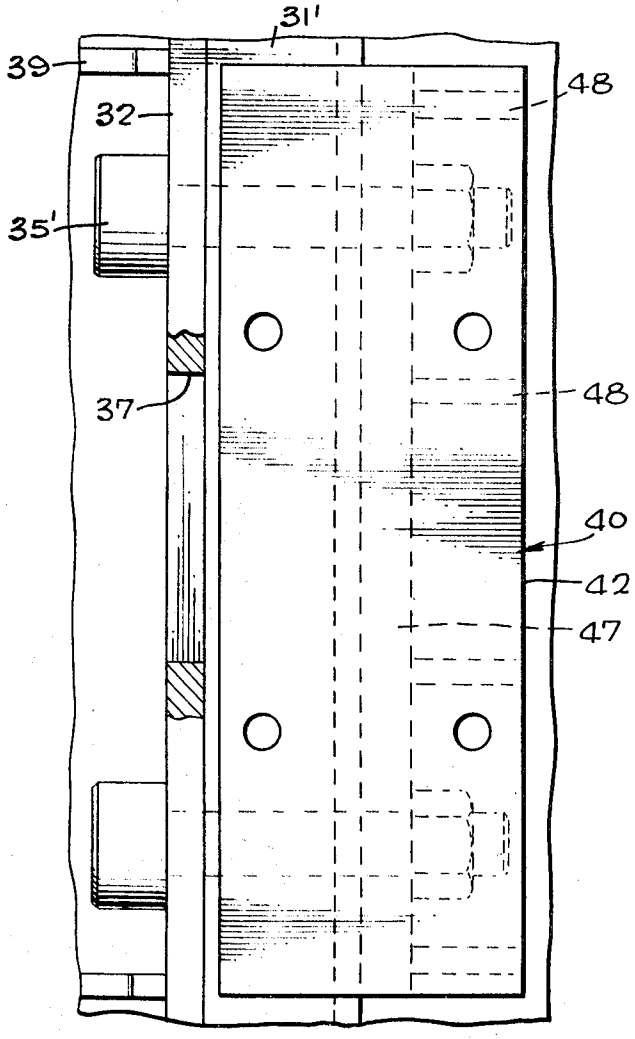


Fig. 6

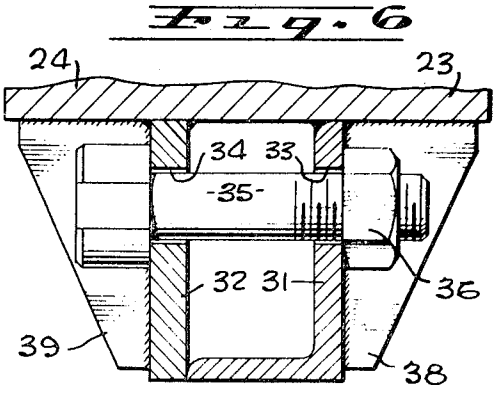
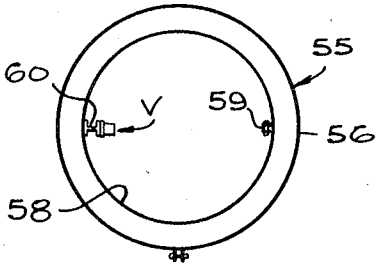


Fig. 7



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MOLD CASE AND VIBRATOR ASSEMBLY

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U.S. Cl. 25—30 R 6 Claims

ABSTRACT OF THE DISCLOSURE

The outer steel shell or case of a mold for casting concrete pipe having a gate and vibrators mounted on the gate with their axes of rotation normal to the axis of the case and outside the case.

This invention has to do generally with the field of molding concrete pipe in steel shell molds and more particularly with the art of vibrating the outer shell or case of the mold as the concrete is fed into the mold and for a period thereafter to facilitate filling the mold and to compact the concrete therein.

Heretofore vibrators have been mounted at random positions on the case by means of brackets which in turn are welded to the thin-walled shell. This results in undue localizing of the vibrations and hence a multiplicity of vibrators are required in order to distribute the vibrations throughout the shell with sufficient amplitude to accomplish the desired purpose. A more serious consequence of this, however, has been the concentration of stress forces in localized areas of the shell causing fatigue of the metal and the early failure of the mountings and the shell itself by the cracking of the shell and the mountings. The gate, being a heavy mass extending the full length of the case, acted as a dampener as the vibratory waves came to it.

The present invention provides for the mounting of only a minimum number of vibrators on the gate of the case or shell, or on a longitudinal beam, and the mounting of these in a manner such that the axis of rotation of the vibrator is normal to the longitudinal axis of the shell and completely outside the shell. It has been found through thorough experimentation that considerably fewer vibrators are required to compact the concrete since better distribution of the vibrations throughout the mold case is achieved. It has also been found that the method disclosed herein overcomes the cracking and failure of the case and mountings. With the old-type mountings the case developed cracks within a few weeks and had to be repaired. With the present mounting, cases have been used for several months without failure.

It is believed that the mounting of the vibrators on the gate (or on a beam) results in the gate acting as a force distribution beam which tends to spread the vibrator forces over the entire length of the form. Also, with the vibrators mounted with their axes of rotation normal to the longitudinal axis of the form and outside the form the effective force of each vibrator is radial to the form and the gate thus moves radially in and out and induces waves in the case skin that continue circumferentially from the gate.

Thus an object of the invention is to provide a novel and improved mold case and vibrator assembly in which the mold case embodies a novel vibrator mounting means thereon designed to achieve vibration of the case for compacting concrete and yet results in long wear of the case without undue fatigue thereof. It is also an object to provide a novel method of vibrating the case.

A further object is to provide a novel mounting for a vibrator on a mold case and to provide a novel case.

These and other objects will be apparent from the drawings and the following description. Referring to the drawings:

FIG. 1 is an elevational view, partly in section, of a mold for casting concrete pipe or the like;

FIG. 2 is a cross-sectional view on line 2—2 of FIG. 1, but on a smaller scale;

FIG. 3 is a fragmentary sectional view on line 3—3 of FIG. 1, but on a larger scale;

FIG. 4 is a fragmentary sectional view on line 4—4 of FIG. 1, but on a larger scale;

FIG. 5 is a fragmentary face view on line 5—5 of FIG. 4 as it would appear with the vibrator removed;

FIG. 6 is a fragmentary sectional view on line 6—6 of FIG. 1, but on the same scale as FIG. 4; and

FIG. 7 is a diagrammatic view of a mold showing an alternate form of the invention.

More particularly describing the invention, in FIG. 1 we show a mold **11** for the casting of concrete pipe or the like wherein the concrete is poured into the top of the mold and the mold vibrated to assist in the pouring and compaction of the concrete. The mold has an outer case or shell **12** with which we are chiefly concerned, an inner wall **13** which defines the inner wall of the pipe and suitable annular end ring assemblies at the top and bottom **14** and **15**, respectively, holding the shells in concentric relation and enclosing the annular space **16** at the bottom. Concrete **17** which will form a pipe having a cylindrical wall reinforcement **18** is shown in the mold.

Heretofore molds of this type had been vibrated by the mounting of vibrators of the rotary, air-driven type at random positions over the outer case or shell **12**, but this has resulted in fatigue of the metal and cracking of the case over very short periods of use. In the present invention the vibrators, designated V, are mounted along the mold gate **21**.

The outer case or shell **12** comprises a thin sheet of steel which is substantially circular. This has at least one longitudinal split or parting, depending upon the diameter, and the one shown is provided with one such parting **22** defined by the two substantially rigid gate members **23** and **24**. These are recessed at **26** to receive the edge portions **12'** of the shell **12** and the parts are securely welded together. The adjacent edges of members **23** and **24** may be shaped to be complementary, as shown (FIG. 4), and one edge recessed at **28** to accommodate a gasket **29**.

Each gate member is provided with a longitudinal extending bar which is welded thereto. Thus gate member **23** has an angle bar **31** of L-shape in cross section and member **24** has a flat bar **32**. The bars are provided with registering holes **33** and **34** (FIG. 6), respectively, spaced longitudinally of the bars for the reception of bolts **35** fitted with nuts **36** which serve to releasably secure the parts in tight fitting relation. Holes **37** in bar **32** give access to nuts **46**. Webs **38** and **39** welded at intervals along the bars **31** and **32**, respectively, and the respective gate members lend strength and rigidity to the structure. The short section **31'** of bar **31** extends toward bar **32** and abuts the same when the parts are secured by bolts **35**, creating a fulcrum action and insuring the tight-sealing of gate members **23** and **24** on gasket **29**.

It is a particular feature of the invention that the vibrators V are rigidly mounted on the gate and this is accomplished by means of a special bracket **40** for each vibrator. The bracket comprises a solid member of T-shape in cross section, having a main section or base **42** to which the base **43** of the vibrator is bolted and which in turn is secured to the section **31'** of bar **31** of the gate by bolts **45** and nuts **46**, which retain vibrator and bracket when the gate is opened for stripping, and a central section **47** normal thereto which is secured to the main

portion of bar **31** by bolts **35'**, and nuts **36'**. Webs **48** are provided at intervals to strengthen the bracket and provide rigidity. Bolts **45'** and nuts **46'** also serve to secure the vibrator to the bracket **40**.

The vibrators are so mounted that their axes of rotation are normal to the longitudinal axis of the shell and outside of the shell, or parallel to a line tangent to the shell at the gate. Thus, the axis of the vibrator shown in FIG. 3 is along the broken line **50**. With this construction the effective force of the vibrators is an oscillating movement radial to the mold which moves the gate in and out and induces waves in the case skin that travel circumferentially in both directions from the gate. For extremely large-diameter forms having more than one gate, vibrators would be mounted on each gate. The vibrators themselves are of a standard air-driven type and, by way of example, may be so-called "Vibrolaters" of a type offered for sale by Martin Engineering Company. The cycle of frequency of vibration may in the range of 6,000 to 10,000 c.p.m., although this is not intended as a limitation on the frequency range. Normally the average frequency is about 8,000 c.p.m.

While the construction shown and described is a preferred one, we contemplate that, alternately, the mold might be vibrated from the inside with vibrators attached to the inner wall of the mold. Thus, by way of example, in FIG. 7, we show diagrammatically in cross section a mold **55** with an outer shell **56** and an inner wall **58**. The latter has a gate **59**, but since this is usually of much lighter construction than the gate on the outer shell, we propose to provide a longitudinal beam or bar **60** welded or otherwise rigidly attached to the inner shell or wall **58** and bolt the vibrators V to the beam, either directly or by intervening brackets, at spaced positions along the beam. Preferably the beam should be spaced circumferentially 180° from the gate **59**. The axes of rotation of the vibrators would be normal to a plane extending longitudinally of the inner shell and radially thereof through the beam.

Although we have illustrated and described preferred forms of our invention, we contemplate that various changes and modifications can be made therein without departing from the invention, the scope of which is indicated by the following claims. For example, in the case of mounting vibrators on the outer shell a separate beam might be used in place of the gate, in much the same manner as suggested for the inner shell.

I claim:

1. An outer case and vibrator assembly for a mold for casting concrete pipe or the like, comprising a longitudinally split, thin-walled steel shell, gate means extending longitudinally of the shell along the split, including a relatively rigid gate member rigidly secured to each edge of the shell, the gate members being disposed adjacent to each other with their longitudinal edges contacting each other, and a plurality of separate, longitudinally spaced means for releasably securing the edges of the gate members rigidly together, with each gate member being continuous between adjacent securing means so the gate members serve as an integral stiff beam extending longitudinally along the split, and at least one rotary vibrator rigidly mounted on at least one of said gate members with its axis of rotation normal to the axis of the shell.

2. An outer case and vibrator assembly for a mold for casting concrete pipe or the like, comprising a longitudinally split, thin-walled steel shell, a relatively rigid elongated gate member rigidly secured to each edge of the shell and extending longitudinally of the shell, each

gate member including a relatively flat main member and a bar rigid therewith and projecting transversely of itself outwardly from the main member, a plurality of separate longitudinally spaced bolt means for connecting said bars to tightly secure the gate members together, one of said bars providing a flat outwardly facing mounting surface in a plane parallel to a plane tangent to the rigid shell at the gate, the edge of the mounting surface being held rigidly in contact with the other of said bars by the bolt means, with the bars being continuous between adjacent bolt means so the gate members serve as an integral stiff beam extending longitudinally along the split, a bracket securely bolted to one of said bars and seated against said mounting surface, and a rotary vibrator fixedly secured to said bracket with its axis of rotation substantially normal to the axis of the shell.

3. The case and vibrator assembly set forth in claim **2** in which said bracket comprises a rigid metal member having a flat main section and a second section extending longitudinally thereof and normal thereto, in which said main section of the bracket is bolted to the portion of said one bar providing the outwardly facing mounting surface, and in which said second section is bolted to the outwardly extending portion of said one bar.

4. The case and vibrator assembly set forth in claim **3** in which said bracket is T-shaped in cross section.

5. The case and vibrator assembly set forth in claim **1** in which a plurality of vibrators are mounted in spaced relation longitudinally of the case on one of said gate members with their axes of rotation extending normal to the longitudinal axis of the shell.

6. An outer case and vibrator assembly for a mold for casting concrete pipe or the like, comprising a longitudinally split, thin-walled steel shell, an elongated gate member rigidly secured to each edge of the shell along the split, each gate member including a relatively rigid main member rigidly secured to each edge of the shell along the split, each gate member including a relatively rigid main member rigidly secured to each edge of the shell, the main members having respective longitudinal edges contacting each other, a separate bar rigid with each main member and projecting outwardly from each main member, one of said bars providing a flat outwardly facing mounting surface in a plane parallel to a plane tangent to the case at the gate, a plurality of longitudinally spaced bolt means for connecting the bars to tightly secure the gate members together with the bars being continuous between adjacent bolt means so the gate members form a stiff integral box-beam extending longitudinally along the split in the shell, a bracket securely bolted to said one of said bars and seated against said mounting surface, and a rotary vibrator fixedly secured to the said bracket with its axis of rotation substantially normal to the axis of the shell.

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18—34 R; 25—130 A; 248—14; 249—173